

WHAT IS CLAIMED IS:

1. An optical characteristic measuring apparatus for measuring the characteristics of devices under test having the first optical transmission line letting light through in one direction only and the second optical transmission line letting light through only on the direction opposite to the aforementioned direction comprising:

a variable wavelength light source for generating a variable wavelength light, the wavelength of which is variable;

a first light modulating means for introducing into said first optical transmission line the first incident light obtained by modulating said variable wavelength light by the frequency of the electrical signal inputted;

a first optical/electrical converting means for converting by the optical/electrical conversion process the first incident light having penetrated said first optical transmission line;

a fixed wavelength light source for generating a fixed wavelength light, the wavelength of which is fixed;

a signal source for generating reference electrical signals of given frequencies;

a second light modulating means for injecting into said second optical transmission line the second incident light obtained by modulating said fixed wavelength light by the frequency of said reference electrical signals; and

a second optical/electrical converting means for converting by the optical/electrical conversion process the second outgoing light having penetrated said second optical transmission line; and for outputting the converted second outgoing light onto said first light modulating means.

2. An optical characteristic measuring apparatus for measuring the characteristics of devices under test having the first optical transmission line for letting light through only in one direction and the second optical transmission line for letting light through only in the direction opposite to said one direction comprising:

a fixed wavelength light source for generating a fixed wavelength light, the wavelength of which is fixed;

a first light modulating means for introducing into said first optical transmission line the first incident light obtained by modulating said fixed wavelength light by the frequency of the electrical signals inputted;

a first optical/electrical converting means for converting by the optical/electrical conversion process the first outgoing light having penetrated said first optical transmission line;

a variable wavelength light source for generating a variable wavelength light, the wavelength of which is variable;

a signal source for generating reference electrical signals of given frequencies;

a second light modulating means for introducing onto said second optical transmission line the second incident light obtained by modulating said variable wavelength light by the frequency of said reference electrical signals; and

a second optical/electrical converting means for converting by the optical/electrical conversion process the second outgoing light having penetrated said second optical transmission line and for outputting the converted second outgoing light onto said first light modulating means.

3. An optical characteristic measuring apparatus for measuring the characteristics of devices under test having the first optical transmission line

letting light through only in one direction and the second optical transmission line letting light through only in the direction opposite to said one direction comprising:

a first variable wavelength light source for generating the first variable wavelength light, the wavelength of which is variable;

a first light modulating means for introducing onto said first optical transmission line the first incident light obtained by modulating said first variable wavelength light by the frequency of electrical signals inputted;

a first optical/electrical converting means for converting by the optical/electrical conversion process the first outgoing light having penetrated said first optical transmission line;

a second variable wavelength light source for generating the second variable wavelength light, the wavelength of which is variable;

a signal source for generating reference electrical signals of given frequencies;

a second light modulating means for introducing into the second optical transmission line the second incident light obtained by modulating said second variable wavelength light by the frequency of said reference electrical signals; and

a second optical/electrical converting means for converting by the optical/electrical conversion process the second outgoing light having penetrated said second optical transmission line and for outputting the converted second outgoing light onto said first light modulating means.

4. The optical characteristic measuring apparatus according to claim 2 comprising a third optical/electrical converting means for converting by the optical/electrical conversion process the reflected light generated when said second light modulating means introduces said second incident light into said

second optical transmission line.

5. The optical characteristic measuring apparatus according to claim 1 comprising:

a phase comparing means for measuring the phase difference between the electrical signals for measurement outputted by said first optical/electrical converting means and said reference electrical signals; and

a characteristic computing means for computing the group delay characteristic or the dispersion characteristic of the devices under test by using said phase difference.

6. The optical characteristic measuring apparatus according to claim 4 comprising:

a phase comparing means for measuring the phase difference between the electrical signals for reflection measurement outputted by said third optical/electrical converting means and said reference electrical signals; and

a characteristic computing means for computing the group delay characteristic or the dispersion characteristic of the devices under test.

7. A light generating apparatus used in an apparatus for measuring the characteristics of devices under test having the first optical transmission line letting light through only in one direction and the second optical transmission line letting light through only on the direction opposite to said one direction comprising:

a variable wavelength light source for generating a variable wavelength light, the wavelength of which is variable;

a first light modulating means for introducing into said first optical

transmission line the first incident light obtained by modulating said variable wavelength light by the frequency of electrical signals inputted; and

a second optical/electrical converting means for converting by the optical/electrical conversion process the second outgoing light having penetrated said second optical transmission line and for outputting the converted second outgoing light onto said first light modulating means.

8. An optical characteristic measuring apparatus for measuring the characteristics of devices under test having a first optical transmission line letting light through only in one direction and a second optical transmission line letting light through only in the direction opposite to said one direction comprising:

a first optical/electrical converting means for converting by the optical/electrical conversion process the first incident light having penetrated said first optical transmission line;

a fixed wavelength light source for generating a fixed wavelength light, the wavelength of which is fixed;

a signal source for generating reference electrical signals of given frequencies; and

a second light modulating means for introducing into said second optical transmission line the second incident light obtained by modulating said fixed wavelength light by the frequency of said reference electrical signals.

9. A light generating apparatus used in a measuring apparatus of the characteristics of devices under test having the first optical transmission line letting light through only in one direction and the second optical transmission line letting light through only in the direction opposite to said one direction comprising:

a fixed wavelength light source for generating a fixed wavelength light, the wavelength of which is fixed;

a first light modulating means for introducing into said first optical transmission line the first incident light obtained by modulating said fixed wavelength light by the frequency of electrical signals inputted; and

a second optical/electrical converting means for converting by the optical/electrical conversion process the second outgoing light having penetrated said second optical transmission line and for outputting the converted second outgoing light onto said first light modulating means.

10. An optical characteristic measuring apparatus for measuring the characteristics of devices under test having the first optical transmission line letting light through only in one direction and the second optical transmission line letting light through only in the direction opposite to said one direction comprising:

a first optical/electrical converting means for converting by the optical/electrical conversion process the first outgoing light having penetrated said first optical transmission line;

a variable wavelength light source for generating a variable wavelength light, the wavelength of which is variable;

a signal source for generating reference electrical signals of given frequencies;

a second light modulating means for introducing into said second optical transmission line the second incident light obtained by modulating said variable wavelength light by the frequency of said reference electrical signals.

11. A light generating apparatus used in a measuring apparatus of the

characteristics of devices under test having the first optical transmission line letting light through only in one direction and the second optical transmission line letting light through only in the direction opposite to said one direction comprising:

- a first variable wavelength light source for generating the first variable wavelength light, the wavelength of which is variable;

- a first light modulating means for introducing into said first optical transmission line the first incident light obtained by modulating said first variable wavelength light by the frequency of electrical signals inputted; and

- a second optical/electrical converting means for converting by the optical/electrical conversion process the second outgoing light having penetrated said second optical transmission line and for outputting the converted second outgoing light onto said first light modulating means.

12. An optical characteristic measuring apparatus for measuring the characteristics of devices under test having the first optical transmission line letting light through only in one direction and the second optical transmission line letting light through only in the direction opposite to said one direction comprising:

- a first optical/electrical converting means for converting by the optical/electrical conversion process the first outgoing light having penetrated said first optical transmission line;

- a second variable wavelength light source for generating the second variable wavelength light, the wavelength of which is variable;

- a signal source for generating reference electrical signals of given frequencies;

- a second light modulating means for introducing into said second optical

transmission line the second incident light obtained by modulating said second variable wavelength light by the frequency of said reference electrical signals.

13. An optical characteristic measuring method for measuring the characteristics of devices under test having the first optical transmission line letting light through in one direction only and the second optical transmission line letting light through only on the direction opposite to the aforementioned direction comprising:

- a variable wavelength light generating step for generating a variable wavelength light, the wavelength of which is variable;

- a first light modulating step for introducing into said first optical transmission line the first incident light obtained by modulating said variable wavelength light by the frequency of the electrical signal inputted;

- a first optical/electrical converting step for converting by the optical/electrical conversion process the first incident light having penetrated said first optical transmission line;

- a fixed wavelength light generating step for generating a fixed wavelength light, the wavelength of which is fixed;

- a signal generating step for generating reference electrical signals of given frequencies;

- a second light modulating step for injecting into said second optical transmission line the second incident light obtained by modulating said fixed wavelength light by the frequency of said reference electrical signals; and

- a second optical/electrical converting step for converting by the optical/electrical conversion process the second outgoing light having penetrated said second optical transmission line; and for outputting the converted second outgoing light onto said first light modulating step.



14. An optical characteristic measuring method for measuring the characteristics of devices under test having the first optical transmission line for letting light through only in one direction and the second optical transmission line for letting light through only in the direction opposite to said one direction comprising:

a fixed wavelength light generating step for generating a fixed wavelength light, the wavelength of which is fixed;

a first light modulating step for introducing into said first optical transmission line the first incident light obtained by modulating said fixed wavelength light by the frequency of the electrical signals inputted;

a first optical/electrical converting step for converting by the optical/electrical conversion process the first outgoing light having penetrated said first optical transmission line;

a variable wavelength light generating step for generating a variable wavelength light, the wavelength of which is variable;

a signal generating step for generating reference electrical signals of given frequencies;

a second light modulating step for introducing onto said second optical transmission line the second incident light obtained by modulating said variable wavelength light by the frequency of said reference electrical signals; and

a second optical/electrical converting step for converting by the optical/electrical conversion process the second outgoing light having penetrated said second optical transmission line and for outputting the converted second outgoing light onto said first light modulating step.

15. An optical characteristic measuring method for measuring the

characteristics of devices under test having the first optical transmission line letting light through only in one direction and the second optical transmission line letting light through only in the direction opposite to said one direction comprising:

- a first variable wavelength light generating step for generating the first variable wavelength light, the wavelength of which is variable;

- a first light modulating step for introducing onto said first optical transmission line the first incident light obtained by modulating said first variable wavelength light by the frequency of electrical signals inputted;

- a first optical/electrical converting step for converting by the optical/electrical conversion process the first outgoing light having penetrated said first optical transmission line;

- a second variable wavelength light generating step for generating the second variable wavelength light, the wavelength of which is variable;

- a signal generating step for generating reference electrical signals of given frequencies;

- a second light modulating step for introducing into the second optical transmission line the second incident light obtained by modulating said second variable wavelength light by the frequency of said reference electrical signals; and

- a second optical/electrical converting step for converting by the optical/electrical conversion process the second outgoing light having penetrated said second optical transmission line and for outputting the converted second outgoing light onto said first light modulating step.

16. A light generating method used in a method for measuring the characteristics of devices under test having the first optical transmission line letting light through only in one direction and the second optical transmission line

letting light through only on the direction opposite to said one direction comprising:

- a variable wavelength light generating step for generating a variable wavelength light, the wavelength of which is variable;

- a first light modulating step for introducing into said first optical transmission line the first incident light obtained by modulating said variable wavelength light by the frequency of electrical signals inputted; and

- a second optical/electrical converting step for converting by the optical/electrical conversion process the second outgoing light having penetrated said second optical transmission line and for outputting the converted second outgoing light onto said first light modulating step.

17. An optical characteristic measuring method for measuring the characteristics of devices under test having a first optical transmission line letting light through only in one direction and a second optical transmission line letting light through only in the direction opposite to said one direction comprising:

- a first optical/electrical converting step for converting by the optical/electrical conversion process the first incident light having penetrated said first optical transmission line;

- a fixed wavelength light generating step for generating a fixed wavelength light, the wavelength of which is fixed;

- a signal generating step for generating reference electrical signals of given frequencies; and

- a second light modulating step for introducing into said second optical transmission line the second incident light obtained by modulating said fixed wavelength light by the frequency of said reference electrical signals.

18. A light generating method used in a measuring method of the characteristics of devices under test having the first optical transmission line letting light through only in one direction and the second optical transmission line letting light through only in the direction opposite to said one direction comprising:

a fixed wavelength light generating step for generating a fixed wavelength light, the wavelength of which is fixed;

a first light modulating step for introducing into said first optical transmission line the first incident light obtained by modulating said fixed wavelength light by the frequency of electrical signals inputted; and

a second optical/electrical converting step for converting by the optical/electrical conversion process the second outgoing light having penetrated said second optical transmission line and for outputting the converted second outgoing light onto said first light modulating step.

19. An optical characteristic measuring method for measuring the characteristics of devices under test having the first optical transmission line letting light through only in one direction and the second optical transmission line letting light through only in the direction opposite to said one direction comprising:

a first optical/electrical converting step for converting by the optical/electrical conversion process the first outgoing light having penetrated said first optical transmission line;

a variable wavelength light generating step for generating a variable wavelength light, the wavelength of which is variable;

a signal generating step for generating reference electrical signals of given frequencies;

a second light modulating step for introducing into said second optical transmission line the second incident light obtained by modulating said variable wavelength light by the frequency of said reference electrical signals.

20. A light generating method used in a measuring method of the characteristics of devices under test having the first optical transmission line letting light through only in one direction and the second optical transmission line letting light through only in the direction opposite to said one direction comprising:

a first variable wavelength light generating step for generating the first variable wavelength light, the wavelength of which is variable;

a first light modulating step for introducing into said first optical transmission line the first incident light obtained by modulating said first variable wavelength light by the frequency of electrical signals inputted; and

a second optical/electrical converting step for converting by the optical/electrical conversion process the second outgoing light having penetrated said second optical transmission line and for outputting the converted second outgoing light onto said first light modulating step.

21. An optical characteristic measuring method for measuring the characteristics of devices under test having the first optical transmission line letting light through only in one direction and the second optical transmission line letting light through only in the direction opposite to said one direction comprising:

a first optical/electrical converting step for converting by the optical/electrical conversion process the first outgoing light having penetrated said first optical transmission line;

a second variable wavelength light generating step for generating the second variable wavelength light, the wavelength of which is variable;

a signal generating step for generating reference electrical signals of given frequencies;

a second light modulating step for introducing into said second optical transmission line the second incident light obtained by modulating said second variable wavelength light by the frequency of said reference electrical signals.

22. A computer-readable medium having a program of instructions for execution by the computer to perform an optical characteristic measuring process for measuring the characteristics of devices under test having the first optical transmission line letting light through in one direction only and the second optical transmission line letting light through only on the direction opposite to the aforementioned direction, said optical characteristic measuring process comprising:

a variable wavelength light generating processing for generating a variable wavelength light, the wavelength of which is variable;

a first light modulating processing for introducing into said first optical transmission line the first incident light obtained by modulating said variable wavelength light by the frequency of the electrical signal inputted;

a first optical/electrical converting processing for converting by the optical/electrical conversion process the first incident light having penetrated said first optical transmission line;

a fixed wavelength light generating processing for generating a fixed wavelength light, the wavelength of which is fixed;

a signal generating processing for generating reference electrical signals of given frequencies;

a second light modulating processing for injecting into said second optical transmission line the second incident light obtained by modulating said fixed wavelength light by the frequency of said reference electrical signals; and

a second optical/electrical converting processing for converting by the optical/electrical conversion process the second outgoing light having penetrated said second optical transmission line; and for outputting the converted second outgoing light onto said first light modulating processing.

23. A computer-readable medium having a program of instructions for execution by the computer to perform an optical characteristic measuring process for measuring the characteristics of devices under test having the first optical transmission line for letting light through only in one direction and the second optical transmission line for letting light through only in the direction opposite to said one direction, said optical characteristic measuring process comprising:

a fixed wavelength light generating processing for generating a fixed wavelength light, the wavelength of which is fixed;

a first light modulating processing for introducing into said first optical transmission line the first incident light obtained by modulating said fixed wavelength light by the frequency of the electrical signals inputted;

a first optical/electrical converting processing for converting by the optical/electrical conversion process the first outgoing light having penetrated said first optical transmission line;

a variable wavelength light generating processing for generating a variable wavelength light, the wavelength of which is variable;

a signal generating processing for generating reference electrical signals of given frequencies;

a second light modulating processing for introducing onto said second

optical transmission line the second incident light obtained by modulating said variable wavelength light by the frequency of said reference electrical signals; and

a second optical/electrical converting processing for converting by the optical/electrical conversion process the second outgoing light having penetrated said second optical transmission line and for outputting the converted second outgoing light onto said first light modulating processing.

24. A computer-readable medium having a program of instructions for execution by the computer to perform an optical characteristic measuring process for measuring the characteristics of devices under test having the first optical transmission line letting light through only in one direction and the second optical transmission line letting light through only in the direction opposite to said one direction, said optical characteristic measuring process comprising:

a first variable wavelength light generating processing for generating the first variable wavelength light, the wavelength of which is variable;

a first light modulating processing for introducing onto said first optical transmission line the first incident light obtained by modulating said first variable wavelength light by the frequency of electrical signals inputted;

a first optical/electrical converting processing for converting by the optical/electrical conversion process the first outgoing light having penetrated said first optical transmission line;

a second variable wavelength light generating processing for generating the second variable wavelength light, the wavelength of which is variable;

a signal generating processing for generating reference electrical signals of given frequencies;

a second light modulating processing for introducing into the second optical transmission line the second incident light obtained by modulating said



second variable wavelength light by the frequency of said reference electrical signals; and

a second optical/electrical converting processing for converting by the optical/electrical conversion process the second outgoing light having penetrated said second optical transmission line and for outputting the converted second outgoing light onto said first light modulating processing.

25. A computer-readable medium having a program of instructions for execution by the computer to perform a light generating process used in a process for measuring the characteristics of devices under test having the first optical transmission line letting light through only in one direction and the second optical transmission line letting light through only on the direction opposite to said one direction, said light generating process comprising:

a variable wavelength light generating processing for generating a variable wavelength light, the wavelength of which is variable;

a first light modulating processing for introducing into said first optical transmission line the first incident light obtained by modulating said variable wavelength light by the frequency of electrical signals inputted; and

a second optical/electrical converting processing for converting by the optical/electrical conversion process the second outgoing light having penetrated said second optical transmission line and for outputting the converted second outgoing light onto said first light modulating processing.

26. A computer-readable medium having a program of instructions for execution by the computer to perform an optical characteristic measuring process for measuring the characteristics of devices under test having a first optical transmission line letting light through only in one direction and a second optical

transmission line letting light through only in the direction opposite to said one direction, said optical characteristic measuring process comprising:

- a first optical/electrical converting processing for converting by the optical/electrical conversion process the first incident light having penetrated said first optical transmission line;

- a fixed wavelength light generating processing for generating a fixed wavelength light, the wavelength of which is fixed;

- a signal generating processing for generating reference electrical signals of given frequencies; and

- a second light modulating processing for introducing into said second optical transmission line the second incident light obtained by modulating said fixed wavelength light by the frequency of said reference electrical signals.

27. A computer-readable medium having a program of instructions for execution by the computer to perform a light generating process used in a measuring process of the characteristics of devices under test having the first optical transmission line letting light through only in one direction and the second optical transmission line letting light through only in the direction opposite to said one direction, said light generating process comprising:

- a fixed wavelength light generating processing for generating a fixed wavelength light, the wavelength of which is fixed;

- a first light modulating processing for introducing into said first optical transmission line the first incident light obtained by modulating said fixed wavelength light by the frequency of electrical signals inputted; and

- a second optical/electrical converting processing for converting by the optical/electrical conversion process the second outgoing light having penetrated said second optical transmission line and for outputting the converted second

outgoing light onto said first light modulating processing.

28. A computer-readable medium having a program of instructions for execution by the computer to perform an optical characteristic measuring process for measuring the characteristics of devices under test having the first optical transmission line letting light through only in one direction and the second optical transmission line letting light through only in the direction opposite to said one direction, said optical characteristic measuring process comprising:

- a first optical/electrical converting processing for converting by the optical/electrical conversion process the first outgoing light having penetrated said first optical transmission line;

- a variable wavelength light generating processing for generating a variable wavelength light, the wavelength of which is variable;

- a signal generating processing for generating reference electrical signals of given frequencies;

- a second light modulating processing for introducing into said second optical transmission line the second incident light obtained by modulating said variable wavelength light by the frequency of said reference electrical signals.

29. A computer-readable medium having a program of instructions for execution by the computer to perform a light generating process used in a measuring process of the characteristics of devices under test having the first optical transmission line letting light through only in one direction and the second optical transmission line letting light through only in the direction opposite to said one direction, said light generating process comprising:

- a first variable wavelength light generating processing for generating the first variable wavelength light, the wavelength of which is variable;

a first light modulating processing for introducing into said first optical transmission line the first incident light obtained by modulating said first variable wavelength light by the frequency of electrical signals inputted; and

a second optical/electrical converting processing for converting by the optical/electrical conversion process the second outgoing light having penetrated said second optical transmission line and for outputting the converted second outgoing light onto said first light modulating processing.

30. A computer-readable medium having a program of instructions for execution by the computer to perform an optical characteristic measuring process for measuring the characteristics of devices under test having the first optical transmission line letting light through only in one direction and the second optical transmission line letting light through only in the direction opposite to said one direction, said optical characteristic measuring process comprising:

a first optical/electrical converting processing for converting by the optical/electrical conversion process the first outgoing light having penetrated said first optical transmission line;

a second variable wavelength light generating processing for generating the second variable wavelength light, the wavelength of which is variable;

a signal generating processing for generating reference electrical signals of given frequencies;

a second light modulating processing for introducing into said second optical transmission line the second incident light obtained by modulating said second variable wavelength light by the frequency of said reference electrical signals.